Four New Species of Nudibranchs from Tropical West America

BY

HANS BERTSCH [1] AND ANTONIO J. FERREIRA [2]

(7 Plates)

SINCE 1969 WE HAVE MADE numerous research trips to the tropical West American faunal province. Some of the new information we have found appeared earlier in this journal (e.g. BERTSCH *et al.*, 1973). In this paper, we describe three new species we have collected from the northern Panamic province, and one new species from the Galápagos Islands collected by Gale G. Sphon.

CHROMODORIDIDAE Bergh, 1891

Thorunna Bergh, 1878

Thorunna ***lapislazuli*** Bertsch and Ferreira, spec. nov.

(Figures *1* and *5* to *9*)

Material examined: Four specimens collected intertidally at the Charles Darwin Research Station, Academy Bay, Galápagos Islands (0° 45′ S; 90° 15′ W), in March, 1971, by Gale G. Sphon.

1) **Holotype:** Intact whole animal, deposited in the collections of the California Academy of Sciences, Department of Invertebrate Zoology, CASIZ Type Series no. 595.

2) **Paratypes:** One dissected radula (Figures *5* to *9*), mounted on a microscope slide, deposited in the collections of the California Academy of Sciences, CASIZ Type no. 596 (CASIZ Type Slide Series, no. 367).
3) Two specimens deposited as additional paratypes at the Los Angeles County Museum of Natural History, LACM no. 1614.

Description: Lengths of preserved specimens vary from 4 to 6 mm. Body is the typical chromodorid shape, with mantle margin extending over the sides of the animal's body.

Coloration consists of light blue, navy blue, and orange yellow (Figure *1*). An irregular dorsal median stripe of light blue begins anterior to the rhinophores, widens just behind the rhinophores and then becomes thinner, continuing back to just before the gills. A large area of dark navy blue completely encloses the mid-dorsal light blue stripe, with a patch of navy blue extending across the notum at about ½ the animal's length. This navy blue region is randomly covered with dots and splotches of orange and light blue. The mantle is edged completely by a light blue band. The tail protrudes out behind the posterior portion of the mantle, and has a navy blue streak down its center, which is dotted with orange patches; a light blue band occurs on the border of the foot. The six simply pinnate gills (held upright and close together) and the perfoliate rhinophores are navy blue, with whitish tips.

Radular formula 41 (46–50·1·0·1·46–50). The rows were counted down the center; at the extreme posterior end (lower right hand corner of Figure *5*), the last 3 or 4 rows were not continuous nor easily counted because of the damaged condition of that part of the radula. The half-row formula was based on counts of teeth in the right half of rows 15 through 18. No rachidian tooth. First lateral tooth (Figures *6* and *7*) with a base 2–3 times as broad as the following lateral teeth; rectangular base, which splits at about ½ its length into a thin prong on the inner side, and a bi- and tricuspid upright, backward-curving hook on the outer portion of the tooth; with 2 or 3 smaller denticles on the posterior surface of the outer hook. The rest of the lateral teeth bicuspid, with a narrow base. Some of the inner laterals are strongly hook-shaped (Figure *8*), with 1 to 3 denticles on the posterior surface; the upper bicuspid tip at times bent over the lower tip of the same tooth. Outer laterals are more erect, with only the bicuspid tips forming a pronounced hook (Figure *9*); there are up to 5 denticles on the posterior surface of the cusp. The upright shaft is not straight, but bends con-

[1] Donner Laboratory, Lawrence Berkeley Laboratory, and (mailing address) Department of Zoology, University of California, Berkeley, California 94720; Associate, Department of Invertebrate Zoology, California Academy of Sciences, San Francisco, California 94118
[2] Beta Research Oceanographic Laboratories, Inc., 2060 Clarmar Way, San Jose, California 95128

vexly on the outer surface from where it arises at the base to the tip of the cusp. This curvature allows the teeth in the same row to overlap slightly with each other, providing a stronger cutting edge across the entire radular row. This pattern of articulation between teeth of the same row is accompanied by an inter-row overlap and interdigitation between the elongate bases of the teeth. Such a double interlocking system can be compared with teeth articulation patterns in two other Panamic chromodorids. *Hypselodoris agassizii* (Bergh, 1894) exhibits a similar double interlocking (Ferreira and Bertsch, in prep.), but the upright shafts of the teeth are much shorter, and the bases sturdier than in *Thorunna* ***lapislazuli.*** On the other hand, *Chromodoris marislae* Bertsch, 1973, has only the overlap and interdigitation between the bases of different rows of teeth (Bertsch *et al.*, 1973).

Discussion: The generic placement of this species, and its relationship with other genera of Chromodorididae, need explanation.

The two most common genera of Chromodorididae are distinguished by their body shapes and radulae. *Hypselodoris* Stimpson, 1855, has a body approximately quadrilateral in sectional shape, without an ample pallial skirt (Thompson, 1972); the radula lacks a median tooth and the lateral teeth are deeply bicuspid. *Chromodoris* Alder and Hancock, 1855, usually has a widely projecting mantle skirt, and the radula has unicuspid lateral teeth. The distinction is not always clear, because of overlapping characteristics.

Kay & Young (1969) describe the radula of the Hawaiian *Hypselodoris vibrata* (Pease, 1860) as having unicuspid outer teeth, and bicuspid inner teeth. However, their illustration does not show the characteristic bicuspid shape; moreover, scanning electron micrographs (by Bertsch) of the radula of a specimen collected in Hawaii by Terrence M. Gosliner (December 1972) reveal that all the teeth are unicuspid. The animal is also characterized by a broad, overhanging mantle edge. It should be classified (under the current understanding) as *Chromodoris vibrata.*

Roller (1970) placed the eastern Pacific *Chromodoris porterae* Cockerell, 1902, in the genus *Hypselodoris,* without any explanatory statements. The description by MacFarland (1966) describes the radular teeth as "apparently bifid at the tip." However, an examination of the radula and the drawings by MacFarland (1966:plt. 34) reveals that the teeth are not bicuspid—they do not have the two large cusps obviously differentiated in size from the denticles occurring in a row along the upright cusp. This species, also, belongs in the genus *Chromodoris.*

The new species, *Thorunna* ***lapislazuli,*** has an obvious *Chromodoris*-type body form. However, the lateral teeth have the bicuspid shape typical of *Hypselodoris.* The generic placement of our new species, then, required an obvious differentiating characteristic. In searching the literature, we found two Indo-Pacific genera distinguished by a unique innermost lateral tooth: the relatively unknown *Thorunna* Bergh, 1878, and *Noumea* Risbec, 1928. Neither of these genera had previously been reported from the eastern Pacific, although *Thorunna picta* (Pease, 1860), new combination, occurs in Hawaii (cf. Kay and Young, 1969, for its synonymy), and the Panamic *Chromodoris tura* Marcus and Marcus, 1967, has a radula which places it among the *Thorunna-Noumea* group (= *Thorunna tura,* new combination).

Thorunna was established by Bergh to accommodate the Philippine species *furtiva.* He described the genus (Bergh, 1878: 575) as having a chromodorid body shape, with no labial armature, rachis naked, and innermost lateral tooth much broader than the following lateral teeth. Bergh later emphasized (1892: 119) that *Thorunna* is almost completely similar to *Chromodoris.* Eliot (1908: 110) reported *T. furtiva* from the Red Sea, and Marcus & Marcus (1960: 901–902) reported two specimens of *Thorunna* sp. from the Maldive Islands in the northern Indian Ocean. The only other reports of this genus that we could find in the literature were discussions on its taxonomic placement. Thiele (1931: 433) placed it in the subfamily Thorunninae; Odhner (1939: 26) changed it to the Acanthocyclinae, quoted by Marcus & Marcus (1967: 167) as Actinocyclinae. Most recently, Odhner (in Franc, 1968) classified *Thorunna* in the Chromodorididae, and placed *Noumea* as a synonym of the older species. He gave no reasons for the synonymy, but did give a generic description, with no mention at all of labial armature.

The genus *Noumea* was named by Risbec (1928) to include three species from New Caledonia. Since then, additional species of *Noumea* have been named by Risbec (1930), Baba (1937; 1949), Burn (1966), and Marcus &

Explanation of Figures *1, 2*

Figure *1*: *Thorunna* ***lapislazuli*** Bertsch & Ferreira, spec. nov.; photograph by David K. Mulliner

Figure *2*: *Laila* ***janssi*** Bertsch & Ferreira, spec. nov.; photograph by Antonio J. Ferreira of a Costa Rican specimen

Figure 1

Figure 2

Marcus (1970 a). The genus includes those species of chromodorids with a radular formula of n.1.0.1.n., the first lateral tooth with a highly enlarged base (Risbec, 1928: 165). Baba (1949: 144) states that *Noumea* differs from *Glossodoris* only in that the 1st lateral tooth is differentiated from the following laterals by being decidedly broader, and Marcus & Marcus (*op. cit.*: 163) characterize *Noumea* as chromodorids with the innermost lateral tooth twice as broad as the following ones.

Apparently, the only difference between *Noumea* and *Thorunna* is that *Thorunna* lacks labial armature. The decision to synonymize these genera must rest on an evaluation of the generic significance of the presence or absence of labial armature among the chromodorids. Marcus & Marcus (1970 a: 163) have judged that the "radulae furnish the best generic characters. The jaw elements, rods, hooks, or platelets, are useful for the separation of the species." Based on an extension of this opinion to include labial armature as being only of specific importance, we have followed Odhner's synonymy of the genera, and have named our Galapagan new species, *Thorunna* ***lapislazuli.***

Thorunna ***lapislazuli*** differs in its coloration and radular pattern from the known species of *Thorunna.* None of the others have the inner spike on the 1st lateral tooth. Of the Panamic chromodorid species, *T.* ***lapislazuli*** is most similar to *T. tura.* The notum of *T. tura* has a dark violet center, with scattered fire-red spots, and *T.* ***lapislazuli*** has a light blue center, with orange spots in the navy blue area around the periphery of the center. *Thorunna* ***lapislazuli*** has a larger number of teeth per row than *T. tura,* and has an inner spike on the 1st lateral tooth which *T. tura* lacks.

The name ***lapislazuli*** was chosen in reference to the blue coloration of this animal.

Polyceratidae Alder & Hancock, 1855
(emended spelling, Keen, 1971)

Laila MacFarland, 1905

Laila ***janssi*** Bertsch and Ferreira, spec. nov.

(Figures *2* and *10* to *15*)

Material examined: 1) **Holotype:** One specimen collected subtidally (in 5–7 meters of water under a rock on a sandy bottom) in Bahía Santa Elena, Guanacaste, Costa Rica (10° 56′ N; 85° 49′ W), on February 13, 1972, by Antonio J. Ferreira. The intact whole animal has been deposited as the holotype in the collections of the California Academy of Sciences, Department of Invertebrate Zoology, CASIZ Type no. 597.

2) **Paratype:** Dissected radula (Figures *10* to *15*), mounted on a microscope slide, of a second specimen collected at Bahía Santa Elena (under the same rock with the holotype) by Antonio J. Ferreira on February 13, 1972; deposited in the collections of California Academy of Sciences, CASIZ Type no. 598 (CASIZ Type Slide Series no. 368).

3) **Additional records:** Nine specimens, in 1 foot of water, on the west side of Isla Partida (24° 33′ N; 110° 24′ W) in the southern Gulf of California, on August 12, 1973, by Antonio J. Ferreira. Largest specimens measured 8 mm in body length.

Laila janssi has a range of over 2000 km, from the southern Gulf of California to northern Costa Rica.

Description: Oval body shape, fringed with rows of bulbous pallial processes; dorsal surface raised slightly along the central portion (Figure *2*). Body length of preserved holotype 3.4 mm; width, 2.0 mm; larger pallial processes 1.7, 2.6, and 2.4 mm long. Dorsum smooth, except for a row of about 9 papillae, the same yellow orange color as the dorsum surface, situated lengthwise along the center of the notum, beginning anterior to the rhinophores and ending in front of the gills. Body color yellow-orange, with numerous small orange dots covering the dorsum and foot. About three irregular rows of numerous orange, club-shaped papillae completely surround the notum, projecting from the pallial margin; papillae increase progressively in size from the outer ones inward. Largest papillae (about 9–10 per side), almost ⅓ the body length of the animal, exhibit an exaggerated club-shape, with the distal ½ to ⅔ of its length greatly inflated. Smaller lateral processes (more than 18 per side) are less markedly club-shaped. Papillae anterior to rhinophores are thin and elongate, only slightly spindle-shaped; about ¼ of them are almost twice as long as the other frontal papillae. All papillae are yellow-orange colored; the specimens from Costa Rica had a prominent apical white dot, whereas the specimens from Isla Partida had a small dark orange dot. This was the only difference between the populations that we found.

Rhinophores are orange, with about 10–13 leaves on the clavus.

The 3 long, tripinnate orange gills are in a triangular grouping, one anterior and one on each side of the anal opening.

Length of radula is three times its width. Radula formula of paratype is 59 (8–14·1·1·0·1·1·8–14); the last three rows are poorly differentiated. Rachis consists of a row of single, nearly square plates (Figures *10* and *13*), with two parallel ridges running lengthwise along the center of the plates. The innermost of the two pleural teeth in each half-row is a thin, straight shaft, the distal third ending in a posteriorly-directed hook (Figure *14*). The base of the tooth is widened into a lateral flange on the outer side; this flange articulates into the curved inner surface at the base of the second pleural tooth. This hook is completely worn away in the first 16 anterior rows. The outer pleural tooth is a thick, branching structure (Figures *10, 14* and *15*). About ⅓ the distance from its base, the outer surface curves laterally to a wing-like point, then curves inward until the shaft bifurcates at the top. The distal end of the shaft is formed into two hooks, an inner, small one pointing posteriorly, and a large lateral hook which protrudes at right angles to the inner cusp and main shaft, and then curves sharply downwards bent back against the side of the shaft (Figures *14* and *15*). The outer laterals are closely set, approximately quadrangular in shape (Figures *11* and *12*). The posterior surface is evenly concave. The inner edge of the posterior surface forms a sharp point. Along the inner edge of the entire tooth, a ridge increases in height from the sharp posterior point to the raised anterior flange. Below this ridge is a groove which articulates with the outer side of the adjacent inner tooth (Figure *12*). The anterior edge of the tooth is fairly straight, except for a slight depression just before the raised anterior flange.

Discussion: There is only one other species of the genus known, *Laila cockerelli* MacFarland, 1905, which occurs along the Pacific coast of the United States and in the northern part of the Panamic province (Lance, 1961). *Laila cockerelli* has two morphological variations: a northern form, ranging from Vancouver Island, British Columbia, Canada, to Point Conception, California, which has low white tubercles scattered randomly over the notum; and a southern form, ranging from Point Conception south along the Pacific coast to Cabo San Lucas, Baja California, Mexico, and then north in the Gulf of California to Bahía de los Angeles, Baja California, which has a single row of red tubercles spaced irregularly down the center of the notum (Keen, 1971).

Laila cockerelli and *L. **janssi*** are closely related; the general radula pattern and body shapes are similar, but striking differences exist which readily permit a specific separation. The body color of *L. cockerelli* is pure white, while that of *L. **janssi*** is light yellow, with numerous small orange dots covering the dorsum; the pallial processes of *L. cockerelli* are white, tipped with red-orange, whereas *L. **janssi*** has light orange processes with an apical white dot. *Laila **janssi*** has a row of papillae down the center of the notum, separating it from the northern form, with the color of the papillae the same as the rest of the dorsum, separating it from the southern form of *L. cockerelli*. *Laila cockerelli* has 5 branchial plumes; *L. **janssi*** has only 3.

The radula of *Laila cockerelli* has been described by MacFarland (1906: 135; 1966: 105) and Marcus (1961: 21–22), and differs in at least four ways from that of *L. **janssi**:* 1) the number of teeth rows is apparently less in *L. **janssi**;* 2) the rachidian plate of *L. **janssi*** has a rough texture with parallel ridges, whereas it is smooth in *L. cockerelli;* 3) the large outer cusp on the 2nd pleural tooth of *L. **janssi*** is much longer and curls back down along the length of the shaft, but it is short and protrudes fairly straight off the main shaft in *L. cockerelli;* 4) the shape of the outer lateral teeth of *L. **janssi*** have a deeper indentation on the posterior surface, and the anterior inner flange occurs on all the lateral teeth, but in *L. cockerelli* this flange is developed only in the first four lateral teeth, and then becomes obliterated in the outer teeth.

The specific name ***janssi*** was chosen to honor Mr. Edwin Janss, Jr., artist-photographer and collector of nudibranchs, in appreciation for his contributions to malacozoology and his support and encouragement of researchers in the field.

Explanation of Figures *3, 4*

Figure *3*: ***Flabellina stohleri*** Bertsch & Ferreira, spec. nov.; photograph by Hans Bertsch

Figure *4*: ***Phidiana lascrucensis*** Bertsch & Ferreira, spec. nov.; photograph by Antonio J. Ferreira of a specimen collected March 21, 1971, in Bahía Banderas, Nayarit, Mexico

Figure 3

Figure 4

FLABELLINIDAE Bergh, 1890

Flabellina Voight, 1834

Flabellina ***stohleri*** Bertsch and Ferreira, spec. nov.

(Figures *3* and *16* to *21*)

Material examined: Seven specimens collected subtidally in 2 to 3 meters of water at the lower end of the bay south of Punta San Francisquito (28° 26′ N; 112° 52′ W), Baja California, Mexico, on August 24, 1971, by Hans Bertsch, Eugene V. Coan, and Ray Holiday. The animals were found, in the mid-afternoon, crawling among algae that was on top of rocks. This diurnal behavior is similar to that reported for *Flabellina telja* Marcus and Marcus, 1967, by FERREIRA & BERTSCH (1972). The animal swims by lateral bending of the body (see FARMER, 1970, for a description of this method), as does *Coryphella iodinea* (COOPER, 1863) and *Flabellina telja* (MACFARLAND, 1966, and MARCUS & MARCUS, 1967).

1) **Holotype:** One intact whole specimen, 6.5 mm long preserved, deposited in the collections of the California Academy of Sciences, Department of Invertebrate Zoology, CASIZ Type no. 599.

2) **Paratypes:** One dissected radula (Figures *16* to *21*), mounted on a scanning electron microscope viewing stub, deposited in the collections of the California Academy of Sciences, Department of Invertebrate Zoology CASIZ Type no. 600 (CASIZ Type Slide Series no. 369).

3) An additional 5 entire specimens, also deposited at California Academy of Sciences, Department of Invertebrate Zoology, CASIZ Type Series, no. 601.

Description: The body lengths of 5 living animals (excluding the projecting cephalic tentacles) were 8, 9, 9, 10 and 15 mm. Body color a light orange, everywhere stippled with small white dots (Figure *3*). Cerata and rhinophores are light orange throughout most of their length, and tipped with white at their distal ends. The elongate tentacles (extending a third or more the length of the body; the 15-mm long specimen had cephalic tentacles measuring 6 mm long) are whitish throughout their entire length, as is also the extreme anterior region of the animal's body.

The spindle-shaped rhinophores have 15 to 19 perfoliations. Black eye spots, immediately behind the rhinophores, are visible in the preserved material.

There are 7 groups of cerata along each side of the dorsum; the rows do not arise from the flat sides of the body. Each group of cerata is attached to the dorsum by a single peduncle. The anterior liver has 3 groups of cerata, and is separated from the 4 cerata groups of the posterior liver by the cardiac prominence. The anterior and posterior cerata groups are the shortest, and the groups on either side of the cardiac prominence (numbers 3 and 4) are longest. Proceeding from the anterior to posterior, the numbers of cerata in each group are: 2, 4, 5, 5 or 6, 5, 4, 4.

The anus is located on the right side, below the cardiac hump, about ¼ the distance down the side. The reproductive openings are located on the right side, below the bases of the first and second ceratal groups.

The foot is set off from the side by a slight ridge, its anterior edge is bilabiate and set off from the mouth area by a small notch, and the anterior foot corners extend laterally in a crescent shape.

Radular formula 14 (1·1·1); the top three rachidian teeth, however, are missing (Figure *16*), and the lateral teeth occur only in rows 1 through 8. Lateral teeth have a rectangular base, with the side adjacent to the rachidian set at an oblique angle, slightly concave and coming to a sharp point, with about 9 irregular denticles along its length (Figure *17*). Often, the point is broken off. The rachidian tooth is chevron-shaped, with 6–8 denticles on each side (Figures *18* to *21*). Behind the plane of this main cutting edge is a large median cusp. The cusp has a knob (Figures *19* and *21*), which articulates into a depression in the back of the adjacent tooth (Figure *20*), and then rises to a point behind and between the two large uppermost denticles. The bases of the rachidian have flat outer sides, which come to a slight bump; the bases of the next tooth rest on these lateral bumps, enabling pressure applied on one tooth to be partially sustained by the following tooth.

Discussion: *Flabellina* ***stohleri*** can be distinguished readily from the six previously known species of Flabellinidae occurring in the Panamic province. None of the *Coryphella,* nor the one *Coryphellina,* species have cerata on peduncled supports. Moreover, *Coryphella californica* Bergh, 1904, has extremely long anterior foot corners and cerata; *Coryphella cynara* Marcus & Marcus, 1967, has long cerata almost ⅓ its body length, and purplish and red coloration on a bluish-white body; *Coryphella trilineata* O'Donoghue, 1921, has a translucent white body with 3 opaque white lines occurring along the length of its body; *Coryphella iodinea* (Cooper, 1863) has a rich purple and red color; *Coryphellina rubrolineata* O'Donoghue, 1929, has violet rings on the tentacles, rhinophores, foot corners, tail and cerata, and the rhinophores are papillated on the posterior surface (MARCUS & MARCUS, 1970c). None of these characteristics are shared by *Flabellina* ***stohleri.*** The other *Flabellina, F. telja,* has a bluish-purple body; its radula has more teeth rows and a larger number of denti-

cles flanking the median cusp of the rachidian than does *F. **stohleri.*** The lateral teeth of *F. telja* lack denticles on the inner point, and its base has a concave posterior side (MARCUS & MARCUS, 1967: fig. 81); ***F. stohleri*** has denticles along one side of the point, and has a rectangular base.

This species is dedicated to our friend and mentor, Dr. Rudolf Stohler (editor of *The Veliger* and Research Zoologist, Emeritus, of the University of California, Berkeley), in admiration for his scientific achievements, his encouragement of molluscan studies and students, and his editorial zeal that has made *The Veliger* an outstanding international journal of malacozoology.

FACELINIDAE Odhner, 1939

Phidiana Gray, 1850

*Phidiana **lascrucensis*** Bertsch and Ferreira, spec. nov.

(Figures *4* and *22* to *27*)

Synonymy: *Phidiana* sp. Bertsch, 1971: 16
Phidiana sp. Williams and Gosliner, 1971: 33
Phidiana sp. Bertsch and Smith, 1973: 166

Material examined: 1) **Holotype:** One intact specimen (9 mm long, preserved) collected subtidally in about 2 meters of water in a small cove immediately north of the docks at Bahía Las Cruces (24°13'N; 110°05'W), Baja California del Sur, Mexico, on July 22, 1969, by Hans Bertsch. This specimen has been deposited in the collections of the California Academy of Sciences, Department of Invertebrate Zoology, CASIZ Type no. 602.

2) **Paratypes:** Five intact specimens, collected at the same time as the holotype. These specimens have been deposited in the collections of the California Academy of Sciences, Department of Invertebrate Zoology, CASIZ Type Series no. 603.

3) Three specimens collected intertidally at Bacochibampo Bay (27°55'N; 110°57'W), Sonora, Mexico, on December 26, 1970, by Hans Bertsch. This material, consisting of 1 intact animal (CASIZ Type no. 604) and 2 dissected radulae mounted on SEM stubs (CASIZ Type nos. 605 and 606, CASIZ Type Slide Series, nos. 370 and 371), has also been deposited in the collections of the California Academy of Sciences, Department of Invertebrate Zoology. This material is illustrated by the scanning electron micrographs, Figures *22* to *27*.

4) Dissected radula, mounted on microscope slide by Richard A. Roller, of specimen collected subtidally at N. Isla Cerralvo, July 29, 1969, by Hans Bertsch, deposited in California Academy of Sciences, Department of Invertebrate Zoology, CASIZ Type no. 607, CASIZ Type Slide Series no. 372.

5) Additional records (latitude and longitude of localities not given in this paper can be found in Bertsch, 1973, and Bertsch *et al.*, 1973):

Sonora, Mexico
December 23, 1969, Bacochibampo Bay, 1 specimen, collected by Terrence M. Gosliner and Gary C. Williams

Baja California del Sur, Mexico
(collected by Bertsch:)
July 3, 1969, Bahía Carisalito, 1
July 12, 1969, Bahía Las Cruces, 1
July 16, 1969, NW Isla Cerralvo, 1
July 18, 1969, La Luna, 0.8 km north of Punta Gorda, 1
July 22, 1969, S. end of Bahía Las Cruces, 1
July 24, 1969, N. Isla Cerralvo, 2
July 26, 1969, Bahía Las Cruces, 3
July 29, 1969, N. Isla Cerralvo, 3
July 24, 1972, S. end Isla Espíritu Santo, 2
July 26, 1972, Bahía Carisalito, 3

Explanation of Figures *5* to *9*

The radula of *Thorunna **lapislazuli*** Bertsch & Ferreira, spec. nov.
scanning electron micrographs by Hans Bertsch

Figure *5*: Whole view of radula × 100

Figure *6*: Center of radula, showing widened base and spike of innermost lateral tooth × 1 000

Figure *7*: Close-up view of innermost laterals × 2 325

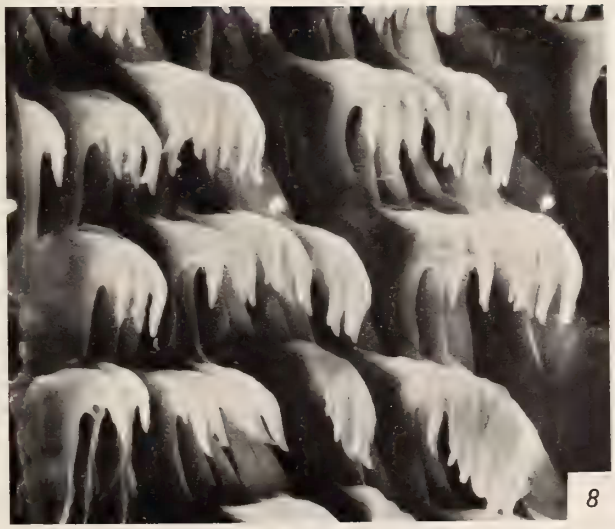
Figure *8*: Inner lateral radular teeth, from center of upper right portion of Figure *5*, showing bicuspid tips, and small denticles on posterior surface of cusp × 1 000

Figure *9*: Outer lateral radular teeth from lower left portion of Figure *5*, showing many denticles on posterior surface of cusp, bicuspid tips, inter- and intra-row articulation, and elongate thin bases × 1 000

5

6

7



8

9